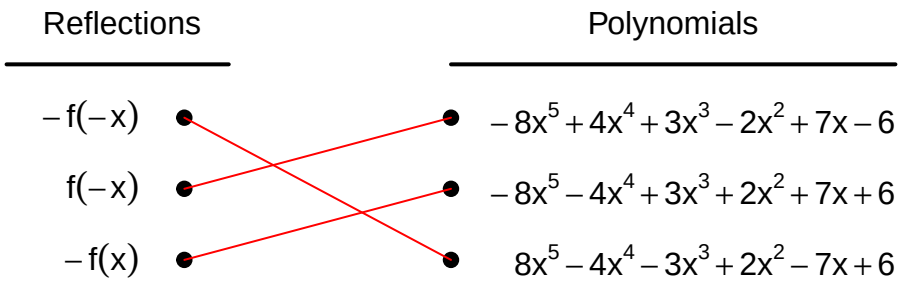
Name: Date:

Exam: Function Reflections (Solution version 20)

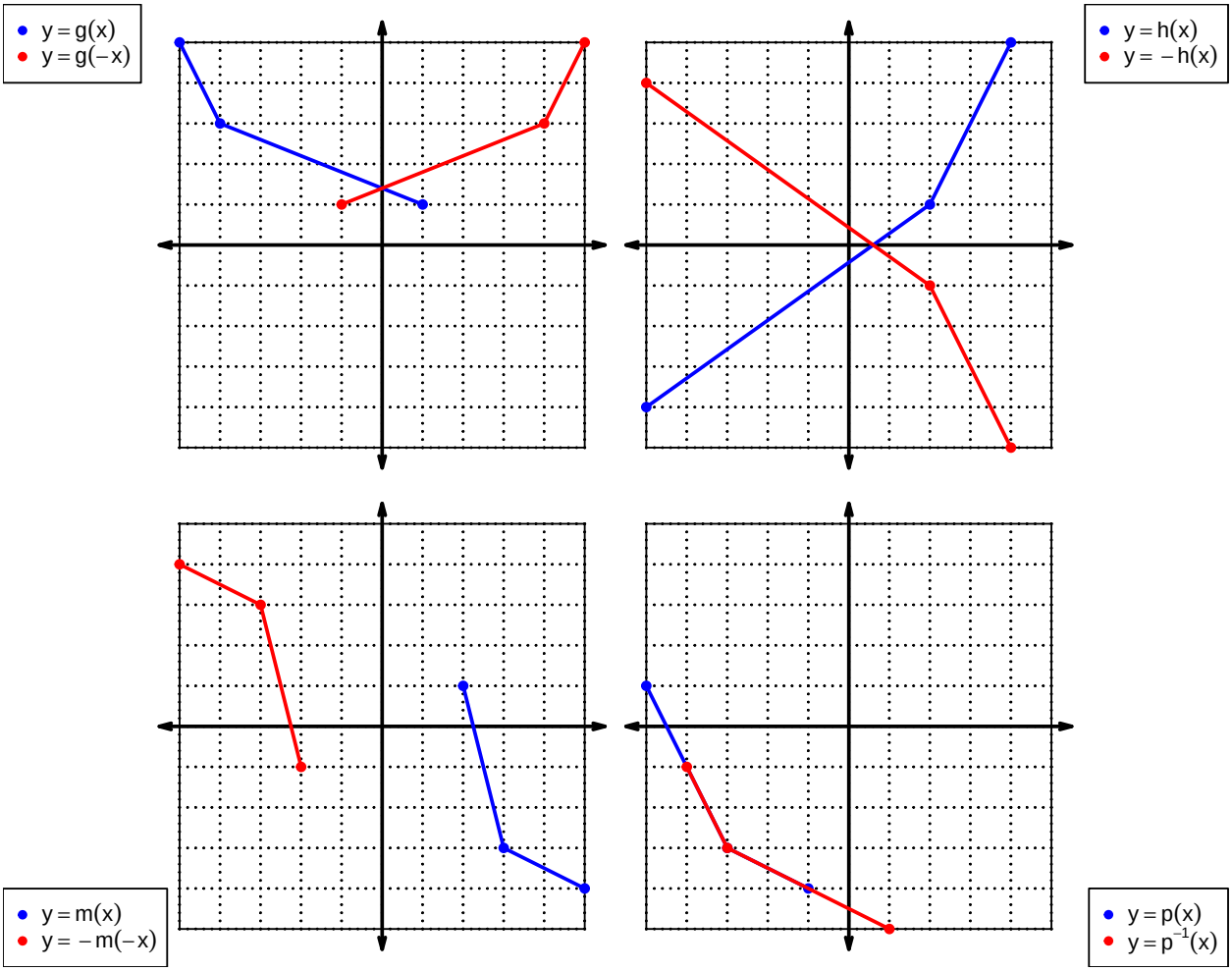
1. Let function f be defined by the polynomial below:

$$f(x) = 8x^5 + 4x^4 - 3x^3 - 2x^2 - 7x - 6$$

Draw lines that match each function reflection with its polynomial:



2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	8	4	9
2	7	7	8
3	1	5	6
4	3	8	2
5	5	1	4
6	9	2	5
7	2	6	1
8	6	9	3
9	4	3	7

3. Evaluate $g(3)$.

$$g(3) = 5$$

4. Evaluate $f^{-1}(9)$.

$$f^{-1}(9) = 6$$

5. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-1)$?

If function f is even, then

$$f(-1) = 8$$

6. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-7)$?

If function h is odd, then

$$h(-7) = -1$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) = x^3 + 1$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = (-x)^3 + 1$$
$$p(-x) = -x^3 + 1$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^3 + 1\right)$$
$$-p(-x) = x^3 - 1$$

   c. Is polynomial p even, odd, or neither?

neither

   d. Explain how you know the answer to part c.

We see that $p(x)$ is not equivalent to either $p(-x)$ or $-p(-x)$, so p is neither even nor odd.

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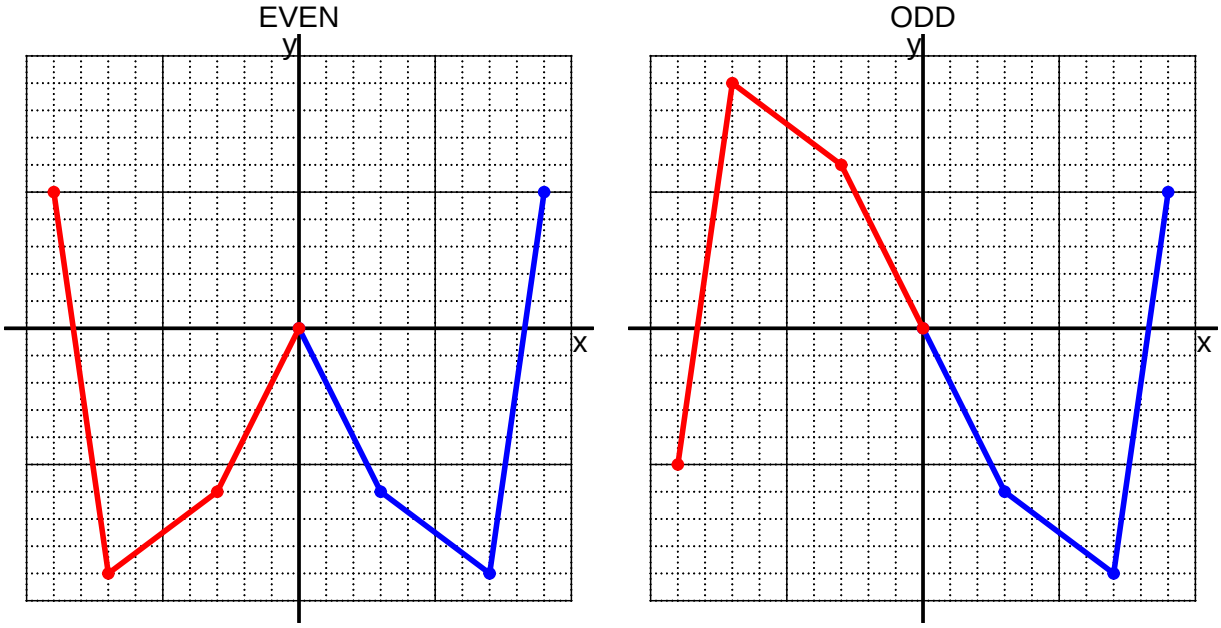
8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 2x - 8$$

a. Evaluate $f(33)$.

step 1: multiply by 2
step 2: subtract 8

$$f(33) = 2(33) - 8$$
$$f(33) = 58$$

b. Evaluate $f^{-1}(54)$.

step 1: add 8
step 2: divide by 2

$$f^{-1}(x) = \frac{x+8}{2}$$
$$f^{-1}(54) = \frac{(54)+8}{2}$$
$$f^{-1}(54) = 31$$

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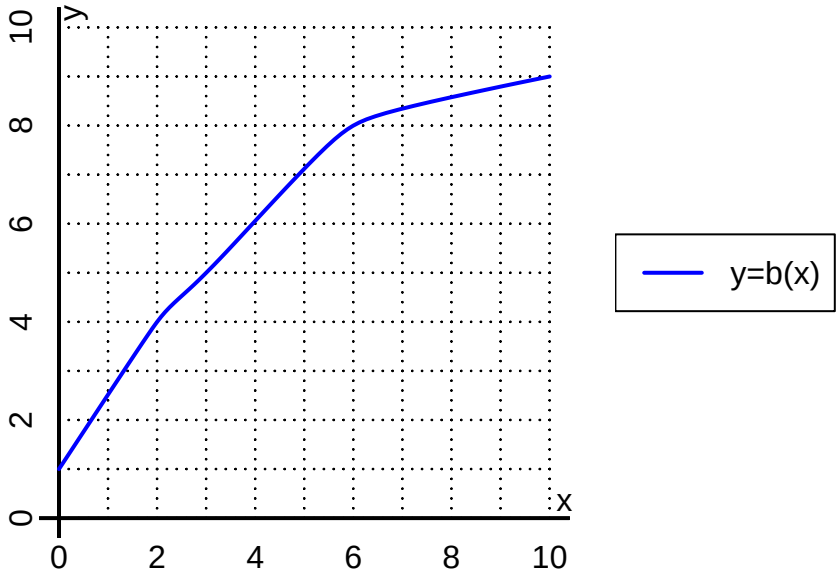
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(2)$.

$b(2) = 4$

b. Evaluate $b^{-1}(8)$.

$b^{-1}(8) = 6$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	8	-8	8	-8
-1	-9	9	-9	9
0	0	0	0	0
1	-9	9	-9	9
2	8	-8	8	-8

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.